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MEMORANDUM

TO: Bob Kirkpatrick – Northern Region
Mary Beth Marks – On-Scene Coordinator

FROM: Allan Kirk
Michael Cormier

DATE: November 7, 2002

RE: Proposed Reclamation Activities for the Fisher Creek Source Area
Como Basin/Glengarry Adit/Fisher Creek Action Memorandum
New World Mining District Response and Restoration Project

This memorandum was prepared to summarize the work proposed for the Fisher Creek Source Area. As described in the Como Basin/Glengarry Adit/Fisher Creek Response Action Engineering Evaluation/Cost Analysis (EE/CA) (Maxim 2002), the preferred alternative for the Fisher Creek Source Area is Alternative FC-3 for all waste dumps that directly impact surface water, except the Glengarry and Gold Dust dumps. Alternative FC-4, total removal to the Selective Source repository, is selected for the Glengarry and Gold Dust dumps.

Alternative FC-3 was selected as the preferred alternative because the impacts of building roads and moving equipment to most of the remaining dump sites in Fisher Creek for removal or treatment of the dumps would be greater than that of leaving the remaining dumps in their current condition. Alternative FC-3, surface controls, involves construction of runoff controls at only those dumps that are in direct contact with a surface water drainage or where erosion processes are transporting mine wastes off-site. In the draft EECA, Alternative FC-3 did not involve amending mine waste with lime, topsoil, organics, or fertilizer, and did not require revegetation. Work under Alternative FC-3 was limited to regrading and runoff controls so that roads were not needed to haul amendments to a site. However, because existing road access is adequate at most of the sites selected for the FC-3 response action, the Forest Service has determined that mine waste will be amended and disturbed areas seeded where possible.

Table 3-1 in the Como Basin/Glengarry Adit/Fisher Creek EECA lists historic mining related sites that contain mine wastes, adit discharges, or unsafe mine openings in the Fisher Creek Source Area. The site ranking is also listed in this table. Figure 3 in the EE/CA shows the location of these Fisher Creek mine dumps.

A number of mine sites in the Fisher Creek Source Area were reclaimed by Crown Butte Mines, Inc., or the USDA Forest Service. These sites are listed in Table 1 (below).

Table 1 Reclaimed Mine Waste Sites in Fisher Creek Source Area		
Site No.	Site Name	Rank
FCSI-96-8	Lower Spaulding Dump	23
FCSI-96-5	Lower Tredennic Dump 1	26
FCSI-96-7	Upper and Middle Spaulding Dump	33
FCSI-96-15-2	Upper Tredennic Dump 2	36
FCSI-96-6	Middle Tredennic Dump 1	45
FCSI-96-15-1	Upper Tredennic Dump 1	70
FCSI-96-15-4	Upper Tredennic Dump 4	74
FCSI-96-15-3	Upper Tredennic Dump 3	79
FCSI-96-15-5	Upper Tredennic Dump 3	79
FCSI-96-9	Small Como Dump	96
FCSI-99-35	Fisher Mountain Dump 3 *	100
FCSI-99-36	Fisher Mountain Dump 4 *	100
FCSI-96-10	Fisher Mountain Trench 1	105
FCSI-99-29	Fisher Mountain Trench 2	108
FCSI-99-32	Fisher Mountain Dump 1	108
FCSI-99-33	Fisher Mountain Dump 2	108
FCSI-96-11	Fisher Mountain Pit	112

Note: * The asterisk indicates that additional work is proposed for these two sites.

During a detailed review of the remaining dumps in Fisher Creek that are not reclaimed, Mary Beth Marks and Maxim personnel selected eight additional sites for clean up that met the criteria for Alternative FC-3. These sites and the three sites selected for Alternative FC-4 (Total Removal) are listed by rank in Table 2, along with specific characteristics and proposed reclamation activities.

As indicated in Table 2, the Como Basin Source Area will be addressed under a separate alternative (Alternative CB-3B) as identified in the EE/CA. There are two additional sites in the Fisher Creek Source Area where no work is currently planned. These sites, Henderson Mountain Dump Ten (FCSI-99-71, ranked #32) and the Lower Tredennic Dump Two (FCSI-99-24, ranked #85), are collapsed adits with very small waste rock dumps that are located on steep sites with very difficult access. Because these two sites have adit discharges, potential response action work for these sites will be reviewed in an EECA to be written in 2003 that will specifically address mine discharges that remain in the District. Recent water quality data are summarized in Table 3 for adit discharges located at the dumps where reclamation work is proposed for the Fisher Creek Source Area.

For the remaining dumps sites in the Fisher Creek Source Area that are not shown in Table 2 or discussed above, No Action is the selected alternative.

Table 2 Proposed Reclamation Activities for the Fisher Creek Source Area									
Site No.	Site Name	Waste Volume (cubic meters)	Area (hectares)	Mine Drainage	Flow (gpm)	Access	Alternative Selected	Work Type	Rank
FCSI-96-2A	Glengarry Dump	9880	0.43	Adit, toe seep	20	Road	FC-4	Waste removal, regrade	15
FCSI-99-1	Sheep Mountain Dump One	140	0.05	Adit, toe seep	10	Road	FC-3	Move waste, divert flow	21
FCSI-96-4	Glengarry Adit and Mill Site	380	0.23	Adit, toe seep	5	Road	FC-4	Waste removal, regrade	22
FCSI-96-1A	Gold Dust Mine and Dump	4330	0.22	Adit, toe seep	15	Road	FC-4	Partial waste removal, regrade, portal closure	24
FCSI-99-11	Como Basin	22,040	3.43	None	0	Road	Como Source Area	Regrade, geomembrane	27
FCSI-99-70	Henderson Mountain Dump Nine	150	0.17	None	0	Road	FC-3	Regrade	31
FCSI-99-53	Henderson Mountain Dump Four	60	0.11	None	0	Road	FC-3	Regrade	40
FCSI-99-68	Henderson Mountain Dump Seven	210	0.04	Adit	2	Tracked but flat	FC-3	Move waste, divert flow	51
FCSI-99-73	Henderson Mountain Dump Thirteen	40	0.03	Adit	6	Tracked but flat	FC-3	Move waste, divert flow	66
FCSI-96-17	Homestake Adit and Dump	320	0.11	Open Portal	0	Road	FC-3	Portal Closure	73
FCSI-99-35	Fisher Mt Dump Three	regraded	0.49	none	0	Road and Tracked (steep)	FC-3	Regrade, construct drainage channel	100
FCSI-99-36	Fisher Mt. Dump Four	regraded	0.67	none	0	Road and Tracked (steep)	FC-3	Construct drainage channel	100

Note: All disturbed areas will be amended as necessary and seeded provided site conditions allow appropriate access for vehicles and equipment.

Table 3					
Selected Mine Drainage Water Quality Data - Fisher Creek Source Area					
Sample Name (Sample Date)	Glengarry* F-8A	Sheep Mnt#1 FCSI-99-1 (7/5/2001)	Sheep Mnt#1 FCSI-99-1 (8/2002)	Gold Dust FCSI-96-1A F-28 (7/16/2001)	Henderson Mtn. Dump 7 FCSI-99-68 (8/2002)
METALS (mg/l)					
Aluminum dissolved	8.8	<0.1		<0.1	<0.1
Aluminum total recoverable	9.5	0.4	<0.1	<0.1	
Cadmium dissolved	0.0016	<0.0001		<0.0001	
Cadmium total recoverable	0.0016	0.0002	0.0009	<0.0001	0.001
Copper dissolved	2.719	0.002		0.002	
Copper total recoverable	3.357	0.035	0.01	0.004	0.013
Iron dissolved	47.7	0.02		0.11	
Iron total recoverable	531	1.01	0.06	0.35	0.87
Lead dissolved	0.021	<0.001		<0.001	
Lead total recoverable	0.021	0.015	0.004	<0.001	<0.001
Manganese dissolved		0.007		0.064	
Manganese total recoverable		0.069	<0.003	0.073	0.08
Zinc dissolved	0.402	0.02		<0.01	
Zinc total recoverable	0.428	0.05	0.07	0.01	0.11
OTHER PARAMETERS					
Sulfate as SO ₄ (mg/l)		17		451	
Hardness as CaCO ₃ (mg/l)		31		595	
Specific Conductance (Sc)**	1042	76			
pH ***	2.9	7.21	7.7		7.3
Total Dissolved Solids (mg/l)	544	85			
FIELD MEASUREMENTS					
pH***	3.1	6.92	5.46	7.54	6.41
Sc**	929	66.13		1005	
Flow, gpm	10-38	0.6	0.5	30	0.1
	Glengarry	Sheep Mnt#1	Sheep Mnt#1	Gold Dust	Henderson Mtn. Dump 7

*average all samples collected

** SC in micromhos per centimeter

*** pH in standard units

mg/l = milligrams per liter

gpm = gallons per minute

Proposed conceptual reclamation activities for each of these sites are described below. It is anticipated that most of this work will be initiated and completed during the 2005 construction season. All disturbed areas will be amended as necessary and seeded provided site conditions allow appropriate access for vehicles and equipment.

FCSI-96-2A - Glengarry Dump

- Protect mining artifacts
- Total removal of wastes to Selective Source repository upon completion of Glengarry Mine Closure
- Adit seep addressed by Glengarry Mine Closure
- Regrade site to blend with natural topography
- Channel alignment, design for higher flow and armoring
- Install erosion mat on disturbed areas
- Replace mining artifacts

FCSI-96-4 - Glengarry Adit and Mill Site

- Total removal of wastes to Selective Source repository upon completion of Glengarry Mine Closure
- Adit seep addressed by Glengarry Mine Closure
- Regrade site to blend with natural topography
- Install erosion mat on disturbed areas

FCSI-99-1 - Sheep Mountain Dump One

- Excavate waste from adit portal area such that adit seep flows around waste rock material on the down hill (south) side of wastes remaining on-site
- Construct infiltration basin with local rock to infiltrate water from adit discharge (?)
- Reshape waste rock to insure waste rock slope angles are stable (less than 2.5V:1H)

FCSI-96-1A - Gold Dust Mine and Dump

- Protect mining artifacts
- Remove a portion of portal timber sets
- Remove sulfide waste rock to Selective Source repository
- Reconstruct artificial waste rock dump with non-acid generating mine waste at portal
- Backfill remaining portal sets
- Portal closure using rock backfill of opening with a wedge of local rock
- Regrade site to blend with natural topography
- Channel alignment and armoring including adit seep drainage
- Install erosion mat on disturbed areas
- Replace mining artifacts

FCSI-99-70 and 53 - Henderson Mountain Dumps Nine-and Four

At these two adjacent sites, part of the dumps result from, and are associated with, a series of 3-4 bulldozer cuts and trenches.

- Regrade area (0.28 hectares) to blend with natural topography to include both waste rock dumps, and bulldozer trenches and cuts.

FCSI-99-68 - Henderson Mountain Dump Seven

- Excavate waste from caved adit portal area and place with wastes associated with workings lying immediately uphill (southwest) of the draining adit site.
- Insure that adit seep flows around remaining waste rock material on the down hill (southeast) side of remaining wastes at the site.
- Reshape waste rock to insure waste rock slope angles are stable, less than 2.5V:1H

FCSI-99-73 – Henderson Mountain Dump Thirteen

- Excavate waste from caved adit portal area and place with wastes to the northeast of the existing waste dump
- Insure that adit seep flows around remaining waste rock material on the down hill side of remaining wastes at the site.
- Reshape waste rock to insure waste rock slope angles are stable, less than 2.5V:1H

FCSI-96-17 - Homestake Adit and Dump

The portal opening at this site represents a safety hazard.

- Repair recessed, locking, steel-bar gate at portal opening
- Backfill portal with local rock

FCSI-99-35 - Fisher Mountain Dump 3

- Regrade drill pads and short roadway to approximate pre-disturbance topography
- Construct armored drainage channel in approximate location of existing drainage

FCSI-99-36 - Fisher Mountain Dump 4

- Extend armored drainage channel from site FCSI-99-35 through this site.

References

Maxim Technologies, Inc., 2002, Como Basin/Glengarry Adit/Fisher Creek Response Action Engineering Evaluation / Cost Analysis; report submitted to the US DA Forest Service in June of 2002, 211p. and appendices.